

## **REMARKS**

### **Status of the Claims**

Claims 1-20 (Cancelled)

Claim 21-42 (New)

### **Claim Rejections under 35 U.S.C. § 112**

The Examiner has rejected claim 16 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner has stated that "frequency domain method" is unclear. Applicant cancelled claim 16 and added new claims 21-40 for the Examiner's consideration.

### **Claim Rejections under 35 U.S.C. §§ 102 and 103**

The Examiner has rejected claims 1, 2, and 13 under 35 U.S.C. § 102(b) as being clearly anticipated by Admitted Prior Art (Applicant's specification, p. 3, ll. 1-10). The Examiner has further rejected claims 3, 4, and 14-20 under 35 U.S.C. § 103(A) as being unpatentable over Admitted Prior Art in view of Williams. It is the Examiner's position the Admitted Prior Art teaches Applicant's invention except for a particular method to estimate the model function. The Examiner relies on Williams to teach use of a non-linear function to indicate the torque in the internal combustion engine. Applicant has cancelled claims 1-20 and added new 21-40 to indicate clearly that the present invention estimates indicated torque using one or more measurements of crankshaft

dynamic variables. In view of Applicant's new claims, Applicant respectfully traverses the rejections.

Applicant's specification states on p. 3, ll. 1-10 that "[c]onventionally, the in-cylinder pressure has been directly measured *using in-cylinder pressure transducers in a laboratory environment*. Then, the indicated torque has been calculated from the measured in-cylinder pressure based on the engine geometry while the net engine torque has been obtained considering the torque losses. However, such direct measurements using conventional pressure sensors inside engine combustion chambers are not only very expensive but also not reliable for production engines."

In this passage of the specification, Applicant explains that prior art techniques that require the use of in-cylinder pressure transducers are expensive and unreliable. Applicant then proposes the present invention which uses measurements of crankshaft dynamic variables (such as the instantaneous angular position, velocity and/or acceleration of the crankshaft) to estimate the in-cylinder pressure and indicated torque. The measurements of crankshaft dynamic variables may be obtained using pre-existing sensors (not in-cylinder pressure transducers) and easily accessible engine state variables. Applicant's invention, therefore, does not rely on the in-cylinder pressure transducers that are discussed in the prior art. Applicant has presented new claims 21-42 to indicate clearly that the present invention determines indicated torque using one or more measurements of crankshaft dynamic variables. Applicant respectfully submits that the Admitted Prior Art is not relevant to the techniques of the present invention which are based on crankshaft dynamics and therefore, cannot support the present rejections under § 102 or 103. Applicant further respectfully submits that because the

Admitted Prior Art is not relevant to the present invention, it cannot be combined with Williams to support the present rejections under § 103.

In view of Applicant's amended claims, Applicant respectfully submits the present application is in condition for allowance. Such action is earnestly requested.

Respectfully submitted,

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